

Real power comes from ideas.





We've got watt it takes.

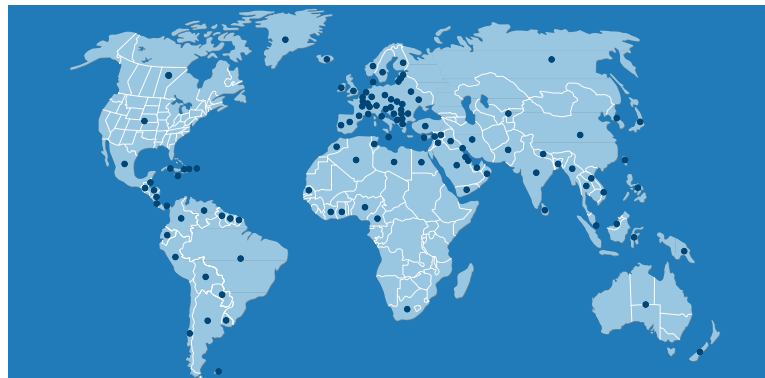


Think, plan and act ahead.

Sustainability means doing business with a permanent eye to the future. That is particularly important in an area as dependent on natural resources as the energy sector. Global energy demands continue to rise. Energy suppliers need to meet them reliably and economically, while also protecting the environment. We are here to help. With all-in solutions for efficient fossil-fuelled thermal power plants. Operators use our pumps, valves, actuators and automation products across all primary and secondary processes in more than 1,000 power stations. KSB products help you manage boiler feed water, condensate and cooling water systems. Around the world, more than 170,000 of our pumps and some three million valves are already in action helping generate energy.

KSB has been serving customers with innovative solutions for more than 130 years. Our know-how and experience across a wide spectrum of pump and valve technology make us the ideal partner for the operators, consultants and plant engineering contractors of high-performance power stations. One of our core skills is identifying synergies and implementing them in economic all-in solutions. That has made us one of the leading specialists worldwide. KSB knows all the ins and outs, and sees quality as part of its company philosophy. We develop materials, run our own international manufacturing network, and put our products through their paces on KSB test facilities. And every one of our 14,000 employees worldwide is committed to customer service. All our energy means more energy for all.

Performance from the start.





To focus on detail, one has to see the bigger picture. So KSB provides solutions, not isolated products. Solutions that we take personally from idea to implementation. We listen to exactly what our customers want – for example the operators of large thermal power stations. Then our engineers design the best pumps, valves, actuators and systems to ensure the facilities' reliability, day in, day out. Made from materials we have developed ourselves, ideally suited to the media to be handled.

For us, comprehensive consultation is crucial. Particularly when the challenges are as complex as those in the energy sector. Customer dialogue enables us to match products' technical parameters exactly to the application in hand. We supply all the engineering to your specifications, right through every unit and system. We partner you throughout the project phase and on to commissioning. And we are still on hand when everything is up and running. With more than 100 service centres around the world, there is always one near you.

KSB provides it all: research, development, consulting, project implementation and service. Plus experience and innovation. And the ability to understand systems while studying every detail. Performance from the start. It is the yardstick we set ourselves. And the promise we give customers.

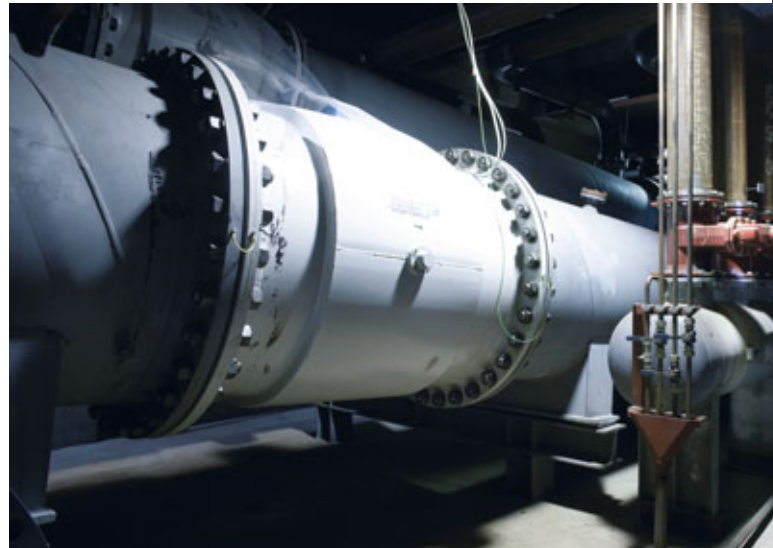


For the energy of the future.

Today's power stations generate energy tomorrow's way. Thanks to KSB technology.

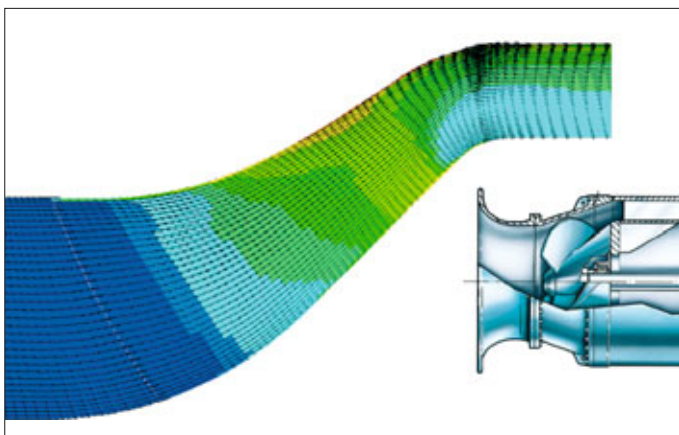
Designing power stations for tomorrow's world puts high demands on the equipment. High-performance drive solutions need ever-increasing efficiency, remarkable operating reliability and low life cycle costs. Our pumps and valves evolve with our customers' demands and requests. Over the past 50 years, the input power of our centrifugal pumps has risen to 40,000 kW, the discharge pressure to 400 bar and the stage pressure to 100 bar.

We invest more than € 20 million every year in research and development, in the latest simulation programs, company test beds and related facilities. Sophisticated power station equipment needs to meet the highest safety standards. Our development engineers work closely with customers throughout the development phase. Together they integrate stability and seismic calculations as well as sound and frequency analyses into the plans. And before a product leaves a KSB site, we test it under real-

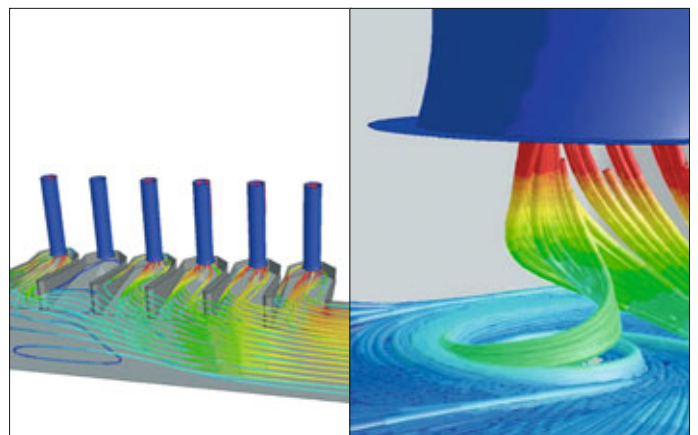


Test facility for cooling water pumps

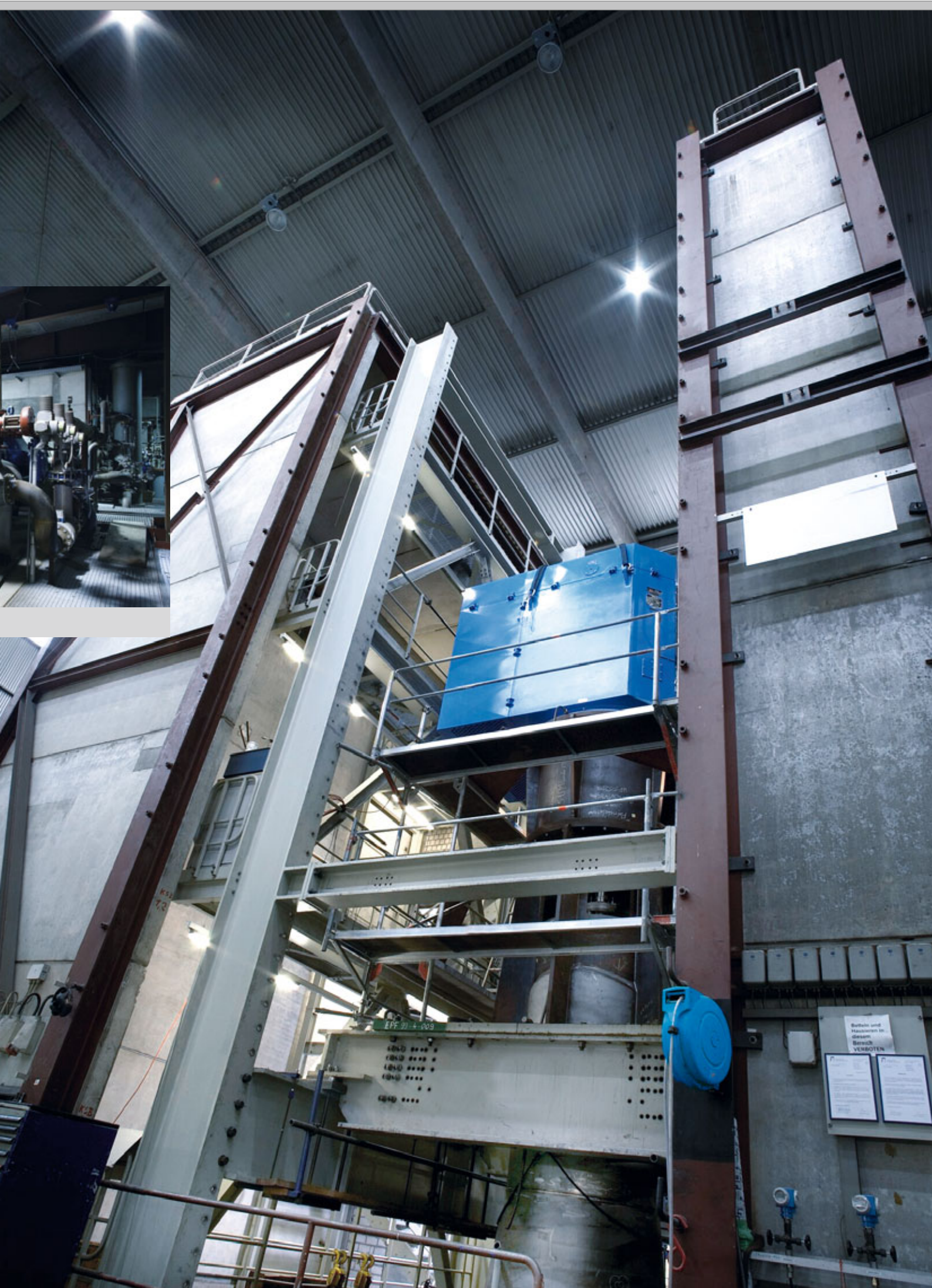
istic conditions. For example, on a test facility for cooling water pumps that can simulate all the operating points specified.



Calculated 3D flow pattern for an impeller. KSB developers analyse these models for maximum hydraulic efficiency.



Analysing the approach flow conditions for intake chambers with strong cross flow enables engineers to include the ideal internals. So the pumps keep running, smoothly and reliably.



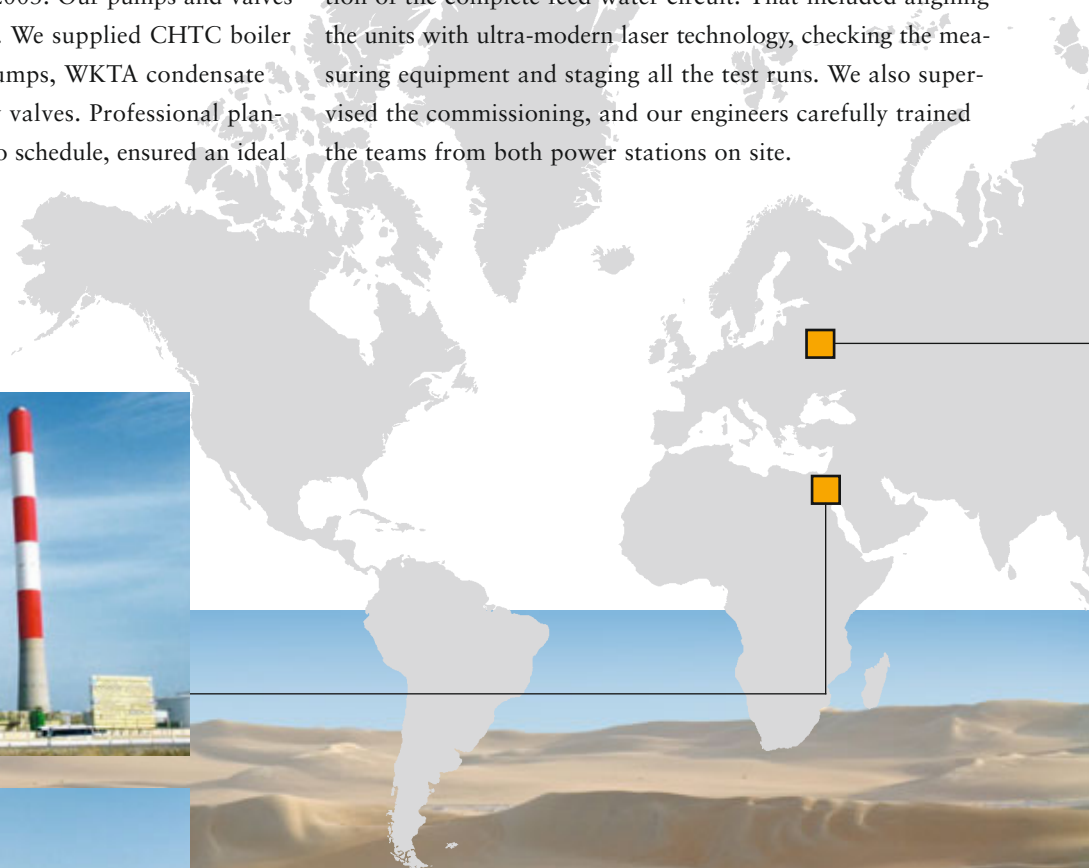
Impressing engineers internationally.

Our pumps and valves keep power stations running on every continent. Customers choose KSB for many reasons. For example, because we meet the highest safety requirements, enable economical operations, and provide comprehensive service on site.

Gulf of Suez and East Port Said/Egypt, gas-fired power stations

Gulf of Suez and East Port Said are two very similar Egyptian power stations that came on line in 2003. Our pumps and valves keep all their key processes moving. We supplied CHTC boiler feed pumps, SEZA cooling water pumps, WKTA condensate pumps and more than 500 butterfly valves. Professional planning, and implementation precisely to schedule, ensured an ideal

cost-benefit ratio. We kept a close eye on every step in installation of the complete feed water circuit. That included aligning the units with ultra-modern laser technology, checking the measuring equipment and staging all the test runs. We also supervised the commissioning, and our engineers carefully trained the teams from both power stations on site.



**Kostromskaya Gres, Kostroma/Russia,
gas-fired power station**

Kostromskaya Gres houses the world's largest gas-fired power station unit, with an output of 1,200 MW. KSB pumps ensure that both it and the other eight 300 MW units keep running smoothly. In 2002 we replaced older Russian models in the 1,200 MW unit with three cartridges from CHTD boiler feed pumps. As well as the very high pressures involved, we also faced the challenge of fitting all the cartridges precisely to the

Russian casings. Thanks to KSB, the pumps are now highly efficient, need fewer inspections and are enjoying a new lease of life. That performance, plus our specialists' skills and know-how, left a strong impression on Kostromskaya Gres management. At the end of 2005, KSB received a follow-up order for ten boiler feed pump cartridges for the 300 MW units.



**Permskaya Gres/Russia,
gas-fired power station**

Permskaya Gres started generating in 1986. Its three 800 MW units made it one of Europe's largest power stations, and the principal supplier for the whole Urals region. By the late 1990's, however, leakages, heavy vibrations and sealing liquid losses of the shaft seals were significantly reducing output. To guarantee electricity supply, the original Soviet boiler feed and booster pumps needed a complete refit.

In 1999, KSB supplied six state-of-the-art cartridges for boiler feed pumps, two spare cartridges and six booster pumps. Our service specialists supervised installation and commissioning. The equipment enabled the systems to operate smoothly and reliably. This has made a decisive improvement to power station availability and efficiency, and, hence, economic efficiency.



**Wai Gao Qiao, Shanghai/China,
coal-fired power station**

Visit the Pudong District of Shanghai, and you will see one of China's largest coal-fired power stations. Wai Gao Qiao marks a milestone in Chinese power station construction. Commissioned in 2003 and 2004, the two 900 MW units have run without a hitch from the word go. And they have set new yardsticks for efficiency, reliability and economical operation. Overall system efficiency is more than 42 %. Our SEZA cooling water pumps,

CHTC motor-driven start-up boiler feed pumps and CHTD turbine-driven boiler feed pumps ensure efficient power generation. We also supplied the entire valve package for the feed water system. KSB also met a special requirement: the large-sized valves have to withstand pressures of 601 bar and temperatures of up to 207 °C. Our service engineers quarterly inspect all the products fitted.



Generating gains for Germany.

Heyden/Germany, coal-fired power station

Heyden coal-fired power station went into operation in 1986 at 760 MW. Today it does 865. To achieve the new operating parameters, the operators increased the speed of the boiler feed pump. That required retrofitting the pump, including a change

in design. Successful modifications reduced the vibrations, improved availability and markedly increased reliability. Innovative KSB technology thus helped reduce Heyden's operating costs by a significant margin.



BoA Niederaussem/Germany,
lignite-fired power station

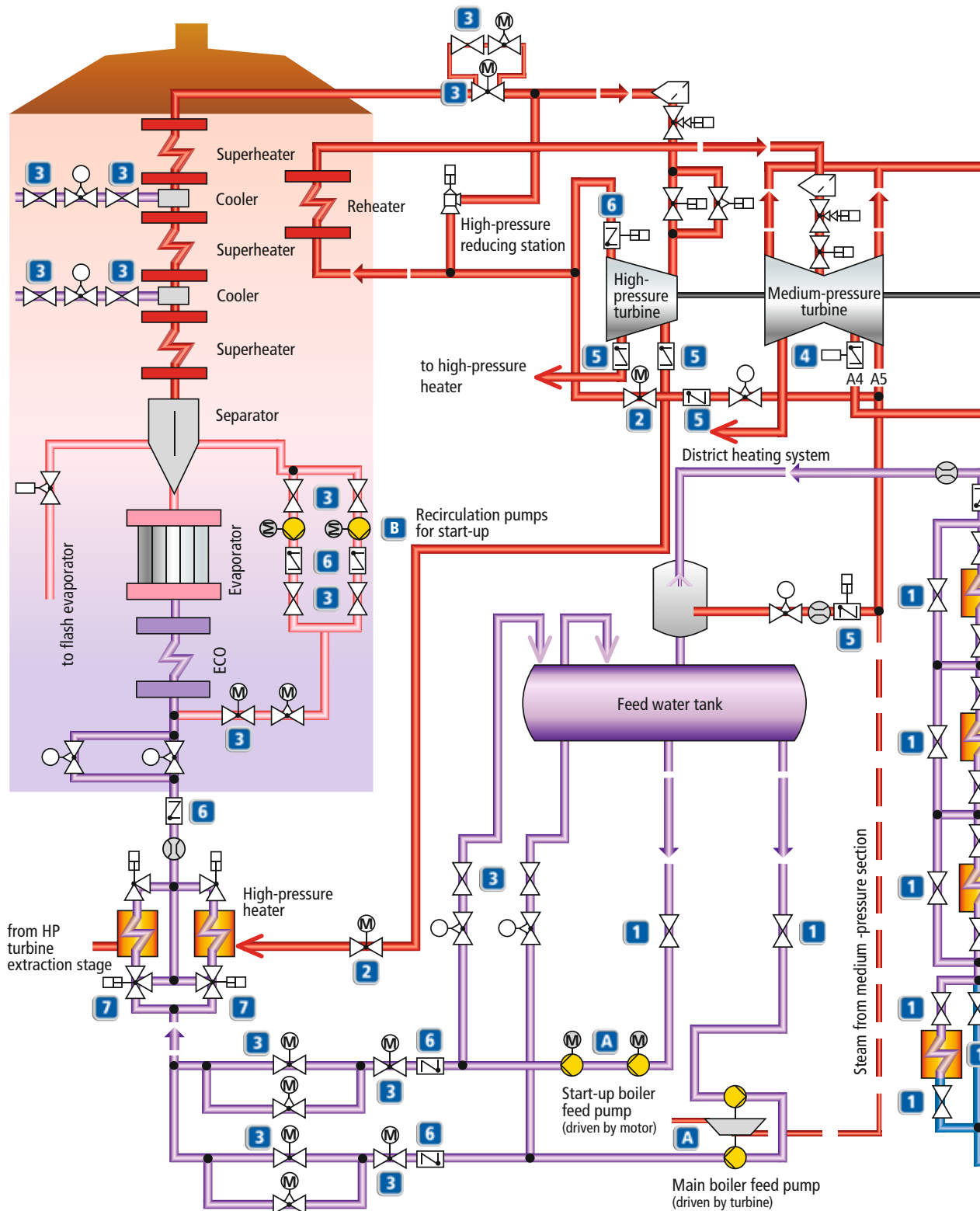
The largest CHTA boiler feed pump ever built by KSB has been in action at the Niederaussem lignite-fired power station since 2002. The full-load pump set is designed for 30 years' operation with above-average efficiency and maximum availability. Optimised plant engineering ensures a high economic efficiency and a considerable reduction in life cycle costs (LCC). As well as the high-performance 40 MW CHTA and its booster pump, Niederaussem uses an LUV boiler recirculation pump and more

than 50 other KSB Amarex, CPK, Eta and Multitec pumps. The power station also employs numerous NORI, ZTS and ZXSVAs high-pressure valves. The commissioning team tracked operating data through the entire commissioning phase. This ensured a faultless start to the feed pump unit's service life. Our experienced plant service specialists planned every step of the installation and kept the project on schedule. That kept costs low and safety high throughout construction and commissioning.

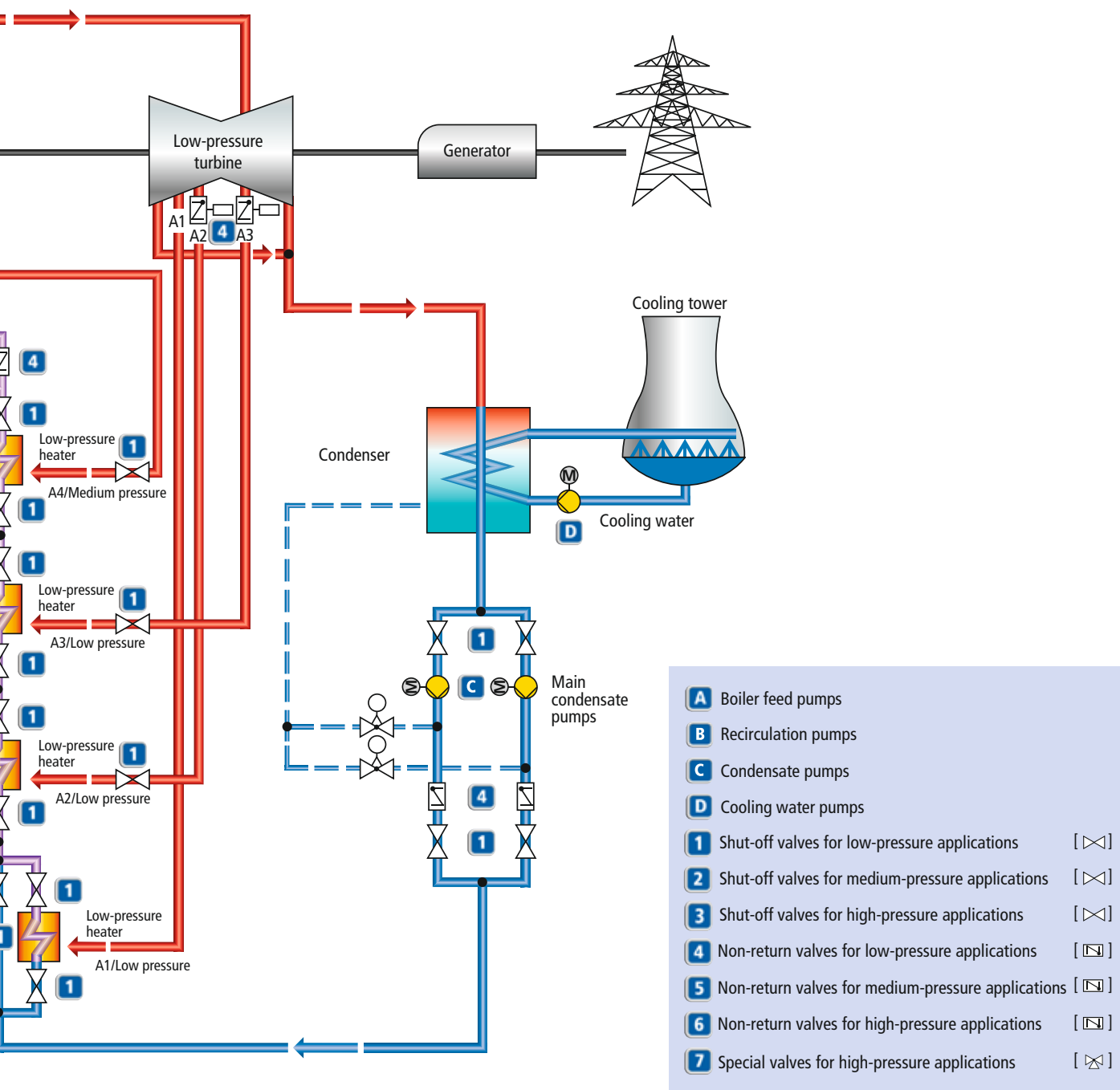


In where the action is.

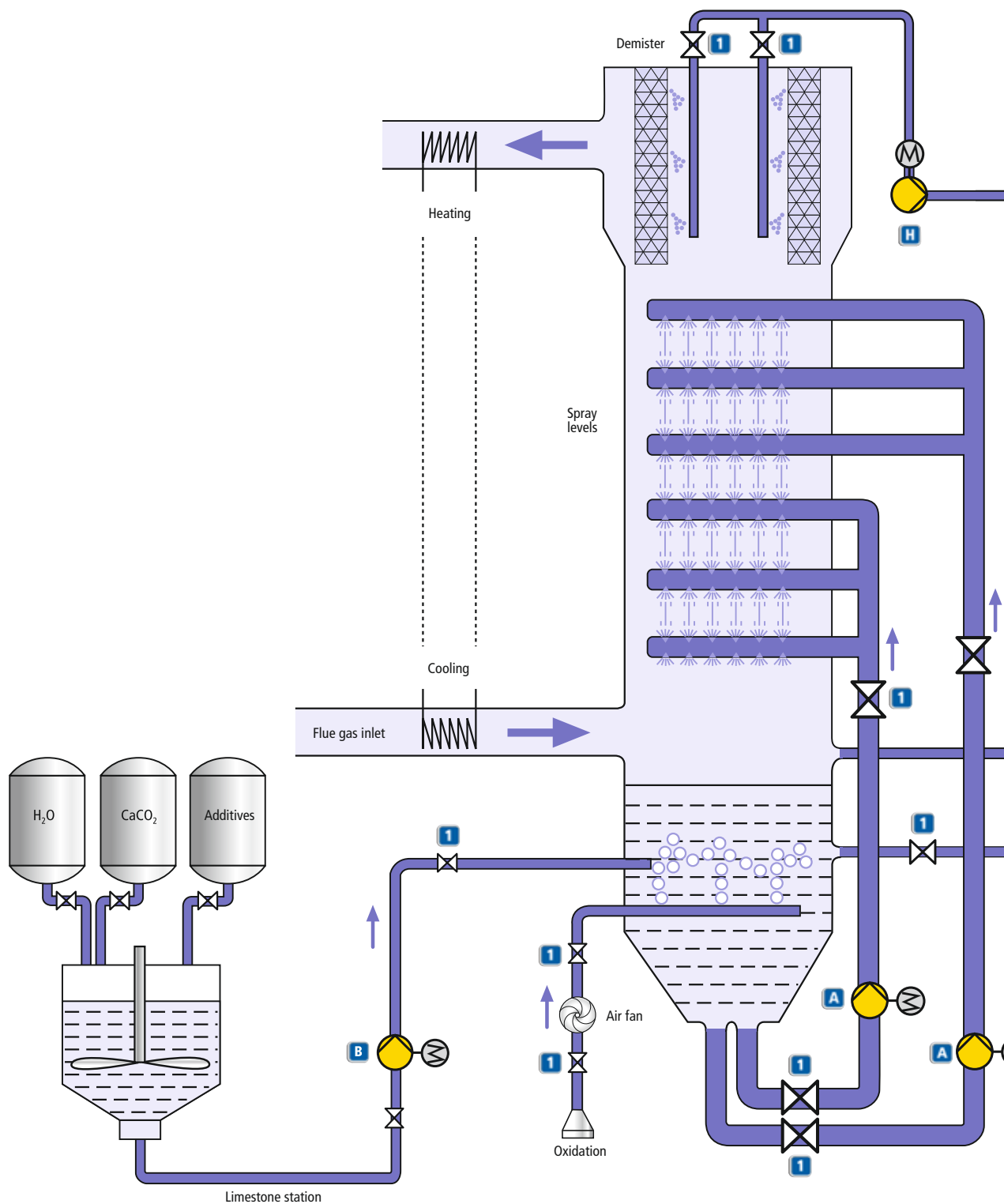
Our pumps and valves feature in all the primary and secondary processes of thermal power stations – like the handling and circulation of boiler feed water, condensate and cooling water. They ensure reliability, safety and absolute precision, coupled with unbeatable economic efficiency. Modern steam power stations are highly efficient. KSB pumps play a major role, and cut operators' energy bills significantly.



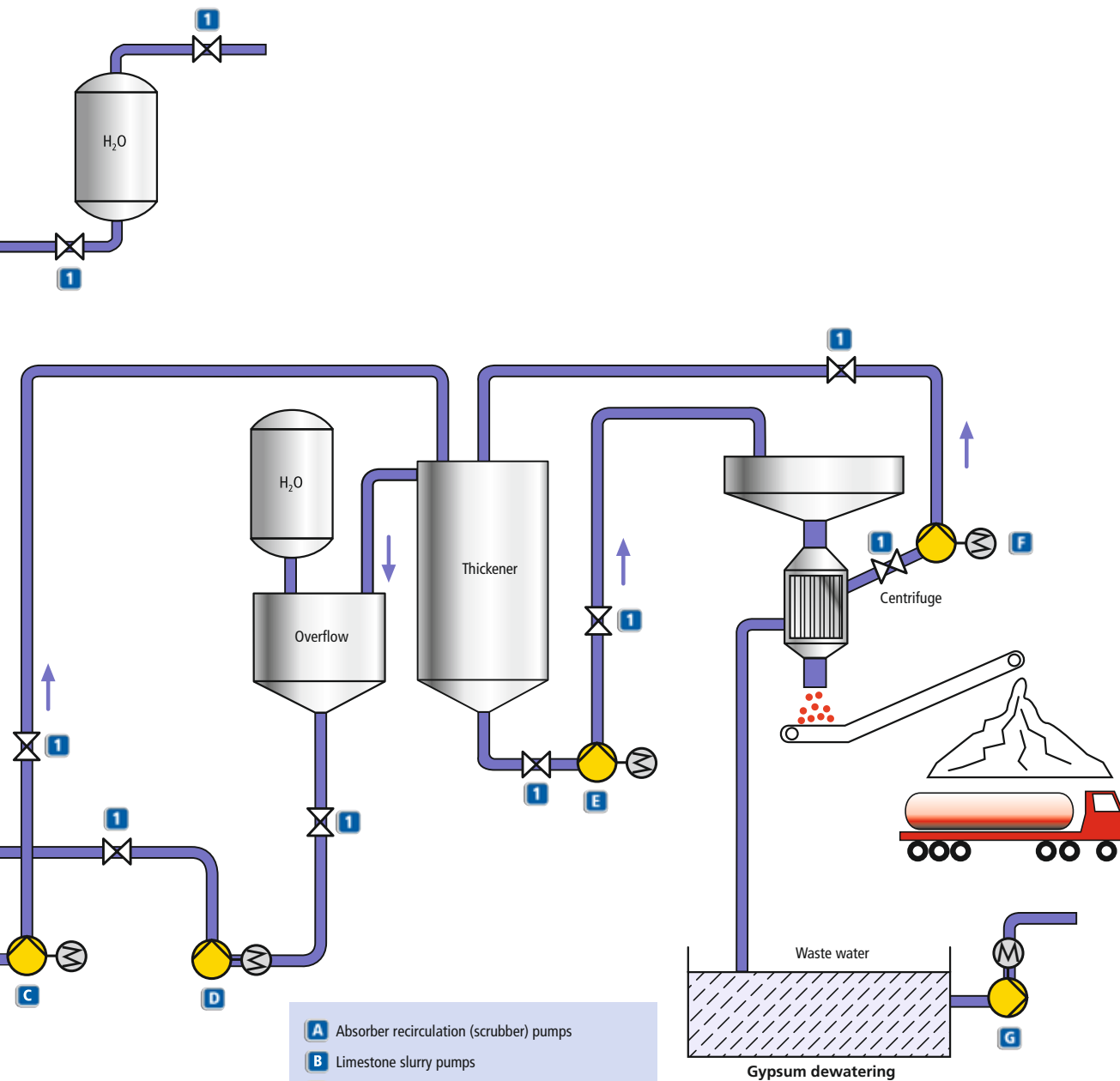
Steam power station circuit



Today's desulphurisation technology removes more than 95% of pollutants from flue gas before release into the atmosphere. Our pumps are in demand across the full range of primary and secondary desulphurisation processes. To ensure maximum operating reliability, we manufacture them from specially developed anticorrosive and wear-resistant materials.

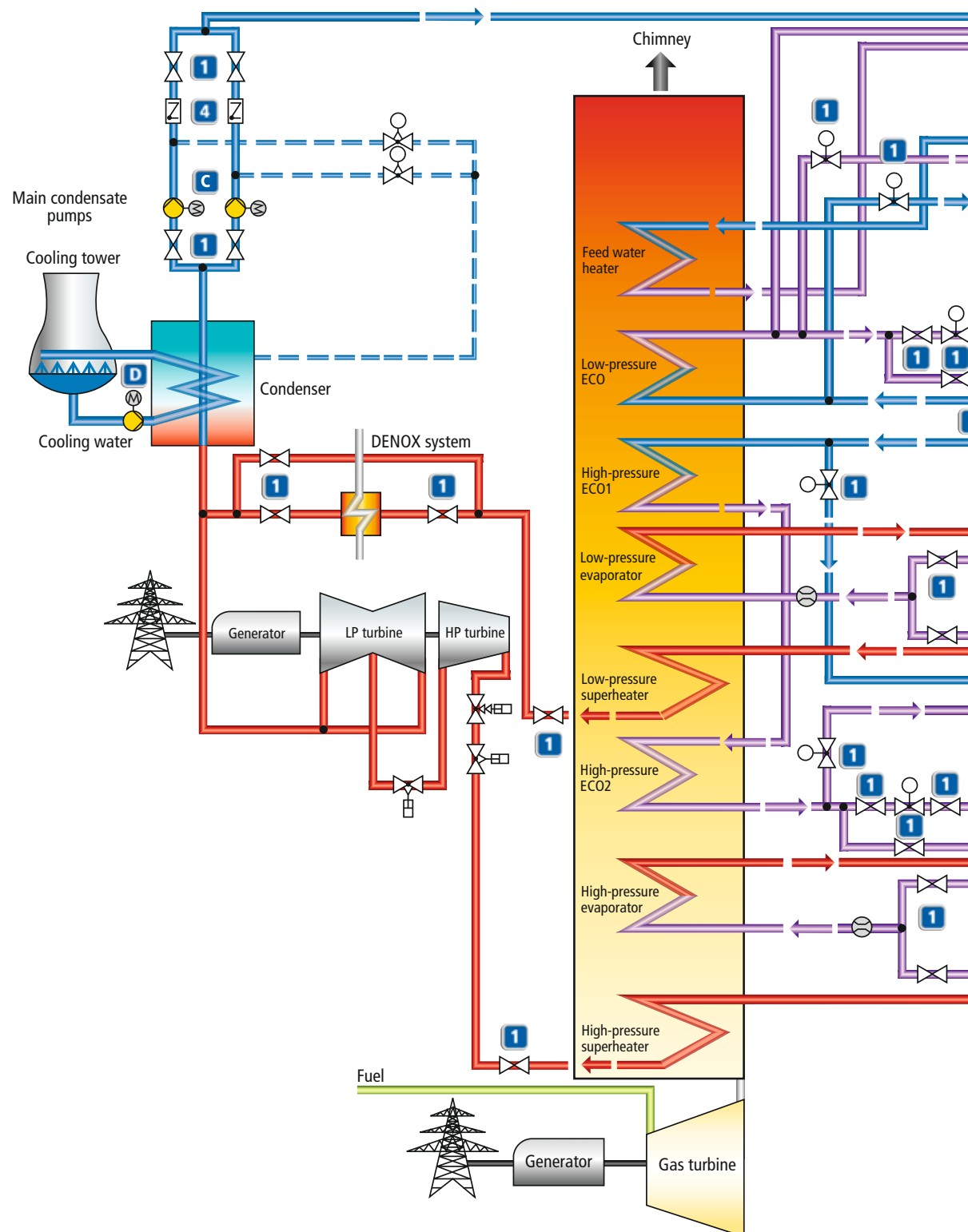


Flue gas desulphurisation circuit

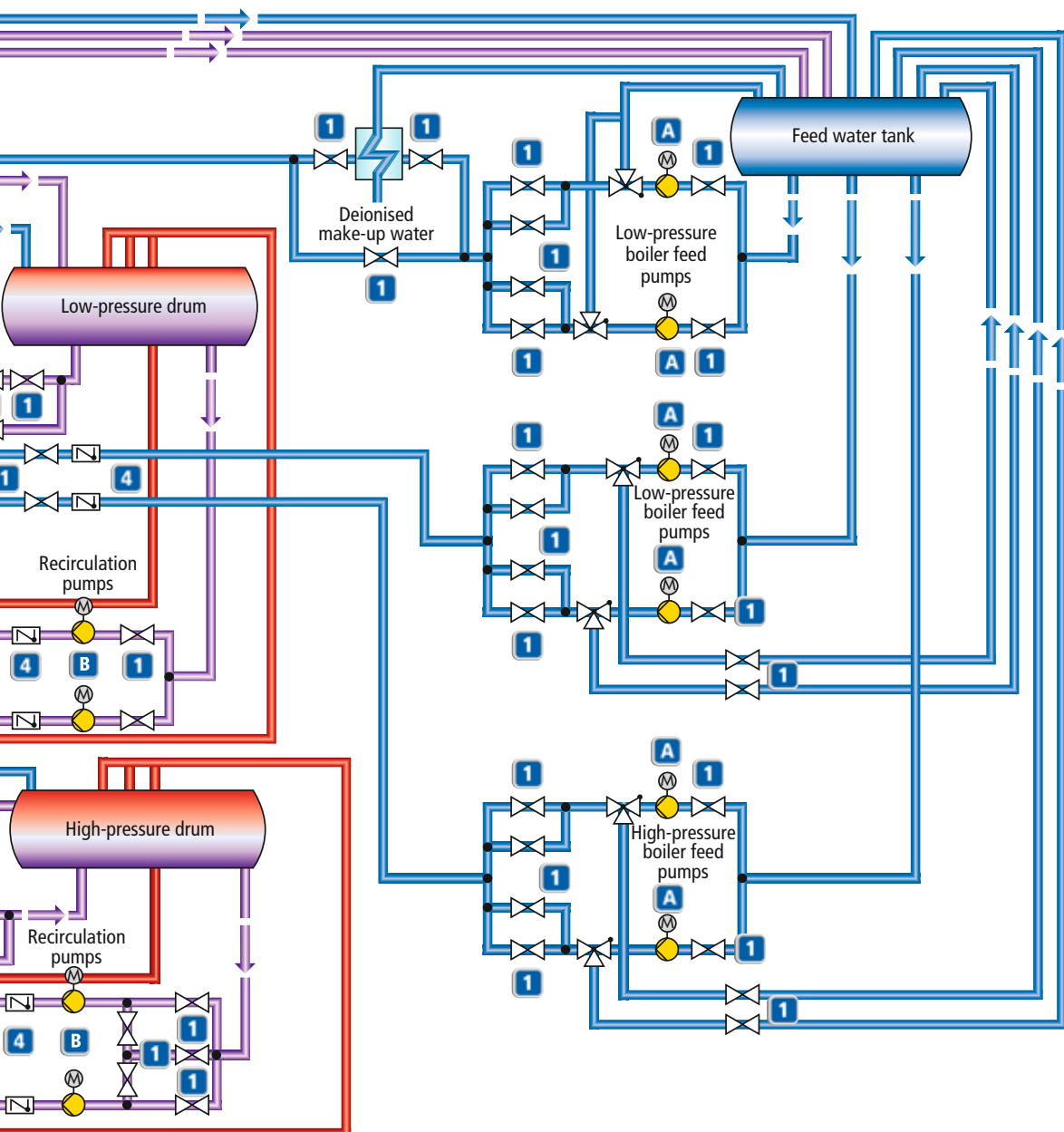


- A** Absorber recirculation (scrubber) pumps
- B** Limestone slurry pumps
- C** Gypsum slurry extraction pumps
- D** Recirculation water pump
- E** Thickener pumps
- F** Filtrate pumps
- G** Waste water sump pumps
- H** Process water pumps
- 1** Shut-off valves for low-pressure applications [X] (butterfly valves/diaphragm valves)

Combined cycle power stations are quick to build, extremely efficient, and release only limited amounts of CO_2 . Our pumps and valves ensure smooth and highly economical operation.



Combined cycle power station circuit



- | | |
|------------------------------|--|
| A Boiler feed pumps | 1 Shut-off valves for low-pressure applications [X] |
| B Recirculation pumps | 4 Non-return valves for low-pressure applications [N] |
| C Condensate pumps | |
| D Cooling water pumps | |



The choice is all yours.

New construction or modernisation. All-in solution or individual service. Pumps, valves or systems. We gear our extraordinarily flexible product range to the special demands of high-performance power stations.

Pumps for steam power stations

| | |
|---|---|
| Boiler feed pumps Barrel-type pumps Ring-section pumps | CHTC/CHTD HGC/HGD YNK/KRHA |
| Boiler recirculation pump | LUV |
| Condensate pumps | WKTA/WKTB WKH |
| Cooling water pumps | SEZ/PHZ/PNZ |
| Auxiliary pumps | Omega KRT KWP HPK HPH RPH CPK SPY Multitec |
| Pumps for flue gas desulphurisation | KWPK FGD LCC |

Pumps for combined cycle power stations

| | |
|----------------------------------|---|
| Boiler feed pumps | HGC HGM |
| Boiler recirculation pump | LUV |
| Condensate pumps | WKTA/WKTB WKH |
| Cooling water pumps | SEZ/PHZ/PNZ SNW/PNW RDLO |
| Auxiliary pumps | Omega KRT KWP HPK HPH RPH CPK SPY Multitec |

Boiler feed pumps

CHTC/CHTD Boiler feed pump



Design: Horizontal high-pressure barrel-type pump with radial impellers, single-entry, multistage, with flanges/weld end nozzles to DIN and ANSI.

Applications: Handling of feed water and condensate in power stations and industrial facilities, generation of pressurised water for bark peeling machines and descaling equipment.

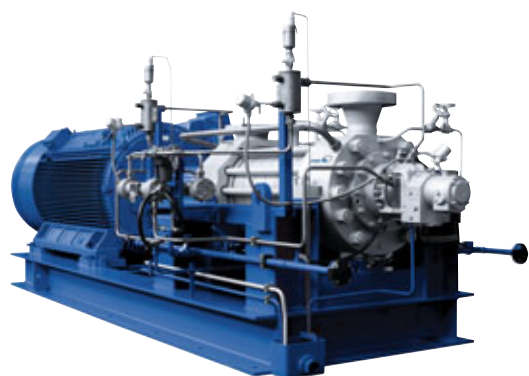
Technical data CHTC

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 1,280 |
| H m: | up to 4,200 |
| p bar: | up to 420 |
| T °C: | up to +200 |
| n min ⁻¹ : | up to 6,750 |

Technical data CHTD

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 3,600 |
| H m: | up to 4,500 |
| p bar: | up to 450 |
| T °C: | up to +210 |
| n min ⁻¹ : | up to 6,200 |

HGC/HGD Boiler feed pump



Design: Horizontal, radially split, multistage ring-section pump with radial impellers, single or double entry.

Applications: Handling of feed water and condensate in power stations and industrial facilities, generation of pressurised water for bark peeling machines, descaling equipment, snow guns, etc.

Technical data HGC

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 1,450 |
| H m: | up to 4,200 |
| p bar: | up to 420 |
| T °C: | up to +200 |
| n min ⁻¹ : | up to 7,000 |

Technical data HGD

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 2,000 |
| H m: | up to 4,500 |
| p bar: | up to 450 |
| T °C: | up to +210 |
| n min ⁻¹ : | up to 6,200 |

YNK/KRHA Boiler feed booster pump



Design: Horizontal, radially split, single-stage, double-entry boiler feed booster pump (booster system) with single or double cast steel volute casing.

Applications: Handling of feed water in power stations and industrial facilities.

Technical data

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 3,700 |
| H m: | up to 280 |
| p bar: | up to 40 |
| T °C: | up to +210 |
| n min ⁻¹ : | up to 1,800 |

HGM Boiler feed pump

Design: Horizontal, radially split, product-lubricated, multistage ring-section pump with radial impellers, axial and radial single-entry inlet.

Applications: Handling of feed water in power stations, boiler feed water and condensate in industrial facilities.

Technical data

| | |
|----------|-------------|
| Q m³/h: | up to 274 |
| H m: | up to 1,400 |
| p bar: | up to 140 |
| T °C: | up to +160 |
| n min⁻¹: | up to 3,600 |



Boiler recirculation pump

LUV/LUVA Boiler recirculation pump

Design: Hermetically sealed vertical recirculation pump, radial or mixed flow impellers, single-entry, single or double stage; suitable for very high system pressures and temperatures. Integrated wet rotor motor to VDE/IEEE specifications, pressure boundary designed in accordance with the common boiler codes.

Applications: Hot water recirculation in large steam generators of power stations and industrial facilities.

Technical data

| | |
|----------|-------------|
| Q m³/h: | up to 7,000 |
| H m: | up to 300 |
| p bar: | up to 350 |
| T °C: | up to +380 |
| n min⁻¹: | up to 3,600 |



Condensate pumps

WKTA/WKTB Condensate pump



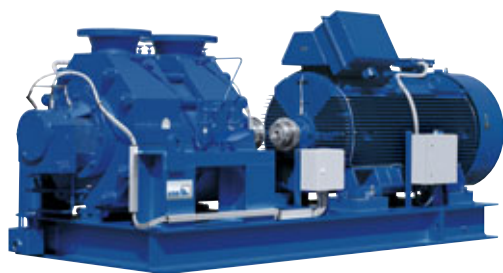
Design: Vertical, multistage, can-type ring-section pump with radial and mixed flow impellers. Single-entry and double-entry suction impellers. Flanges to DIN or ANSI. The can is arranged below the installation floor. The pump is connected with the structure by means of a baseplate.

Applications: Handling of condensate in power stations and energy systems.

Technical data

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 2,600 |
| H m: | up to 340 |
| p bar: | up to 40 |
| T °C: | up to +100 |
| n min ⁻¹ : | up to 1,800 |

WKH Condensate pump



Design: Horizontal, multistage ring-section pump with single-entry, radial impellers. Axial thrust balancing by drum or disc. Oil-lubricated rolling element bearings (oil bath lubrication). Centreline pump feet.

Applications: Handling of boiler feed water and condensate in power stations and industrial facilities.

Technical data

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 1,600 |
| H m: | up to 450 |
| p bar: | up to 64 |
| T °C: | up to +180 |
| n min ⁻¹ : | up to 1,500 |

Cooling water pumps

SEZ/PHZ/PNZ Cooling water pump

Design: Vertical tubular casing pump with open mixed flow impeller (SEZ), mixed flow propeller (PHZ) or axial propeller (PNZ). Pump inlet with bellmouth or suction elbow, pull-out design available, discharge nozzle arranged above or below floor, flanges to DIN or ANSI standards available.

Applications: Handling of raw, pure, service and cooling water as well as seawater in industry, water supply systems, in power stations and seawater desalination plants.

Technical data SEZ

| | |
|----------|--------------|
| Q m³/h: | up to 65,000 |
| H m: | up to 48 |
| p bar: | up to 10 |
| T °C: | up to +40 |
| n min⁻¹: | up to 980 |

Technical data PHZ/PNZ

| | |
|----------|--------------|
| Q m³/h: | up to 65,000 |
| H m: | up to 15/25 |
| p bar: | up to 10 |
| T °C: | up to +40 |
| n min⁻¹: | up to 980 |



SNW/PNW Cooling water pump

Design: Vertical tubular casing pump with mixed flow impeller (SNW) or axial propeller (PNW), single-stage, with maintenance-free Residur® shaft bearings, discharge nozzle arranged above or below floor.

Applications: Irrigation and drainage systems, stormwater pumping stations, handling of raw and pure water, water supply systems, handling of cooling water.

Technical data SNW

| | |
|----------|-------------|
| Q m³/h: | up to 8,600 |
| H m: | up to 90 |
| p bar: | up to 10 |
| T °C: | up to +60 |
| n min⁻¹: | up to 1,450 |

Technical data PNW

| | |
|----------|-------------|
| Q m³/h: | up to 9,000 |
| H m: | up to 10 |
| p bar: | up to 10 |
| T °C: | up to +60 |
| n min⁻¹: | up to 1,450 |



RDLO Cooling water pump

Design: Single-stage, axially split volute casing pump for horizontal or vertical installation, with double-entry radial impeller, mating flanges to DIN, ISO, BS or ANSI.

Applications: Handling of raw, pure, service and cooling water as well as seawater in power stations, water treatment plants, irrigation and drainage pumping stations, fire-fighting systems, shipbuilding and the petrochemical industry, in refineries, pipelines and tank farms; handling of crude oil and refinery intermediates.

Technical data

| | |
|----------|--------------|
| Q m³/h: | up to 10,000 |
| H m: | up to 240 |
| p bar: | up to 25 |
| T °C: | up to +70 |
| n min⁻¹: | up to 1,450 |



Auxiliary pumps

Omega Auxiliary pump



Design: Single-stage, axially split volute casing pump for horizontal or vertical installation, with double-entry radial impeller, mating flanges to DIN, ISO, BS or ANSI.

Applications: Handling of raw, pure and service water as well as seawater in water treatment plants, irrigation and drainage pumping stations, power stations, fire-fighting systems, shipbuilding and the petrochemical industry.

Technical data

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 2,800 |
| H m: | up to 170 |
| p bar: | up to 25 |
| T °C: | up to +105 |
| n min ⁻¹ : | up to 2,900 |

Amarex KRT Auxiliary pump



Design: Vertical, single-stage submersible motor pump in close-coupled design, various impeller types, for wet or dry installation, stationary and transportable design. Design to ATEX available.

Applications: Water and waste water engineering, seawater desalination, in power stations, handling of all types of abrasive or aggressive waste water in industry, especially untreated waste water containing long fibres and solid substances, fluids containing gas/air as well as raw, activated and digested sludge.

Technical data

| | |
|-----------------------|--------------|
| Q m ³ /h: | up to 10,800 |
| H m: | up to 100 |
| T °C: | up to +60 |
| n min ⁻¹ : | up to 2,900 |

KWP / KWP-Bloc Auxiliary pump

Design: Horizontal, radially split volute casing pump in back pull-out or close-coupled design, single-stage, single-entry, available with various impeller types: non-clogging impeller, open multi-vane impeller, free-flow impeller. Design to ATEX.

Applications: Handling of cooling water in power stations, handling of pre-treated sewage, waste water, all types of slurries without stringy substances and pulps up to 5 % bone dry with a maximum density of 1.1 kg/dm³.

Technical data KWP

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 1,300 |
| H m: | up to 100 |
| p bar: | up to 10 |
| T °C: | up to +280 |
| n min ⁻¹ : | up to 2,900 |



HPK-L / HPK Auxiliary pump

Design: Horizontal, radially split volute casing pump in back pull-out design to EN 22 858/ISO 2858/ISO 5199, single-stage, single-entry, with radial impeller. TÜV certification to German Steam Boiler Regulations TRD for HPK on option. Design to ATEX.

Applications: Handling of hot water and thermal oil in piping or tank systems, particularly in medium-sized or large heating systems, forced circulation boilers, district heating systems, etc.

Technical data*

| | |
|----------------------|--|
| Q m ³ /h: | up to 4,150 |
| H m: | up to 185 |
| p bar: | up to 40 |
| T °C: | up to +240 (hot water) up to +350 (thermal oil) |



HPH Auxiliary pump

Design: Horizontal, radially split volute casing pump in back pull-out design, single-stage, single-entry, with centreline pump feet and radial impeller. TÜV certification to German Steam Boiler Regulations TRD on option. Design to ATEX.

Applications: Handling of hot water in high-pressure hot-water generation plants and for use as boiler feed and recirculation pump.

Technical data*

| | |
|----------------------|-------------|
| Q m ³ /h: | up to 1,800 |
| H m: | up to 225 |
| p bar: | up to 110 |
| T °C: | up to +320 |



* Data referred to 2,900 min⁻¹

Auxiliary pumps

CPKN Auxiliary pump



Design: Horizontal, radially split volute casing pump in back pull-out design to EN 22 858/ISO 2858/ISO 5199, single-stage, single-entry, with radial impeller. Also available as variant with “wet” shaft, conical seal chamber, heatable volute casing (CPKN-CHs) and/or semi-open impeller (CPKNO). Design to ATEX.

Applications: Handling of cooling water and condensate, and of aggressive liquids in the chemical and petrochemical industries, in refineries as well as in fire-fighting systems.

Technical data*

| | |
|----------------------|-------------|
| Q m ³ /h: | up to 4,150 |
| H m: | up to 185 |
| p bar: | up to 25 |
| T °C: | up to +400 |

SPY Auxiliary pump



Design: Long-coupled, single-stage volute casing pump in back pull-out design.

Applications: Drainage, irrigation and water supply systems, handling of condensate, cooling water, service water, etc.

Technical data

| | |
|-----------------------|--------------|
| Q m ³ /h: | up to 21,600 |
| H m: | up to 50 |
| p bar: | up to 10 |
| T °C: | up to +105 |
| n min ⁻¹ : | up to 1,480 |

* Data referred to 2,900 min⁻¹

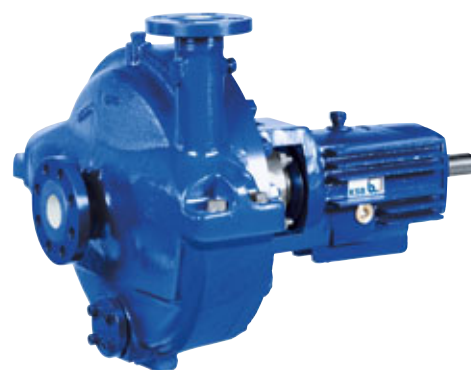
RPH Auxiliary pump

Design: Horizontal, radially split volute casing pump in back pull-out design to API 610, 9th edition, or ISO 13709 (heavy duty), with radial impeller, single-stage, single-entry, centreline pump feet; with inducer, if required. Design to ATEX available.

Applications: Refineries, petrochemical and chemical industry, power stations.

Technical data*

| | |
|----------------------|-------------|
| Q m ³ /h: | up to 4,150 |
| H m: | up to 270 |
| p bar: | up to 51 |
| T °C: | up to +400 |



Multitec Auxiliary pump

Design: Multistage horizontal centrifugal pump in ring-section design, long-coupled and close-coupled variant, with axial or radial suction nozzle, cast radial impellers. Design to ATEX.

Applications: Water and drinking water supply systems, general industry, pressure boosting systems, irrigation systems, in power stations, heating, filter, fire-fighting, reverse osmosis and washing plants, snow guns, etc.

Technical data

| | |
|-----------------------|-------------|
| Q m ³ /h: | up to 850 |
| H m: | up to 630 |
| p bar: | up to 63 |
| T °C: | up to +200 |
| n min ⁻¹ : | up to 2,900 |



* Data referred to 2,900 min⁻¹

Pumps for flue gas desulphurisation

KWPK DN 400-1000 Pump for flue gas desulphurisation



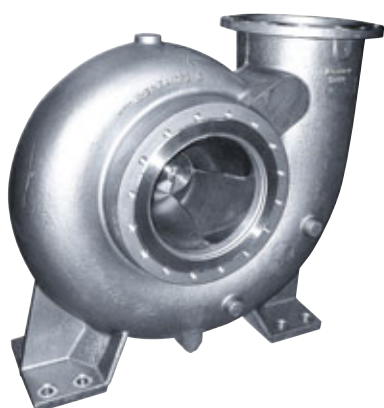
Design: Horizontal, radially split volute casing pump in back pull-out design with high-grade CeramikPolySiC lining.

Applications: As absorber recirculation (scrubber) pump.

Technical data

| | |
|----------------------|--------------|
| Q m ³ /h: | up to 16,000 |
| H m: | up to 30 |
| T °C: | up to +120 |

KWPK DN 40-350 Pump for flue gas desulphurisation



Design: Horizontal, radially split volute casing pump in back pull-out design.

Applications: In secondary circuits as limestone slurry pump, gypsum slurry extraction pump, recirculation water pump and thickener pump.

Technical data

| | |
|----------------------|-------------|
| Q m ³ /h: | up to 3,000 |
| H m: | up to 60 |
| T °C: | up to +120 |

FGD Pump for flue gas desulphurisation

Design: Metal or elastomer lined pump with impellers available in a variety of corrosion and abrasion resistant alloys. Efficiencies approaching 90 % at best efficiency point.

Applications: Absorber recirculation in flue gas desulphurisation.

Technical data

| | |
|----------------------|--------------|
| Q m ³ /h: | up to 18,000 |
| H m: | up to 51 |
| p bar: | up to 7 |
| T °C: | up to +120 |



LCC Pump for flue gas desulphurisation

Design: High-performance, low-maintenance slurry pump recommended for coarse or fine particles from solids-laden waste water to aggressive slurries of an abrasive and/or corrosive nature.

Applications: Mineral processing, power generation, flue gas desulphurisation, mine dewatering, handling of aggregate, ash, tailings, industrial slurries, dredge.

Technical data

| | |
|----------------------|-------------|
| Q m ³ /h: | up to 3,865 |
| H m: | up to 75 |
| p bar: | up to 16 |
| T °C: | up to +120 |







A question of flow-how.

Valves face special challenges in power stations. They have to sustain high pressures and temperatures, and control the flow of a wide range of liquids and gases. And whether in condensate, feed water or steam processes, meeting the prescribed parameters is essential.

KSB valves rise to every challenge. We solder all materials to DIN EN and ASME/ANSI. We make our own rubber and liners, produce diaphragms and run a company foundry – so top quality is guaranteed from the start. We use new high-temperature materials. And we team up for tests

with universities and research institutes. All of which contributes to continuous further development of our products. Innovation, the latest technology and our expertise enable us to meet all the demands of power station operators, consultants and plant engineering contractors. Every type of valve has its own advantages and limitations. Some tasks call for globe valves, others for the gate variety. Sometimes a non-return valve is the right choice, sometimes a butterfly valve. Or diaphragm valves. Or ball valves. And if need be, we modify the standard product or manu-

facture special valves such as feed water bypass valves, start and stop control valves or line blind valves.

See circuits on pages 14 to 19

Shut-off valves

Globe valves

Gate valves

DIN

ANSI

DIN

1 Low-pressure applications**4** PN 10-40

T up to 450 °C

[used in combined cycle power stations and steam power stations]



BOA H/HE



SICCA 150-300 GLC



STAAL 40 AKD/AKDS



NORI 40 ZXL/ZXS



NORI 40 ZXLF/ZXSf



SICCA 800 GLF

2 Medium-pressure applications**5** PN 63-160

T up to 550 °C

[used in steam power stations]



NORI 160 ZXL/ZXS



SICCA 150-600 GLC



STAAL 100 AKD/AKDS



NORI 160 ZXLF/ZXSf



SICCA 900-2500 GLC



SICCA 800-2500 GLF



AKGS-A

3 High-pressure applications**6** PN 250-600**7** T up to 650 °C

[used in steam power stations]



NORI 320 ZXSV



NORI 500 ZXSV



SICCA 900-2500 GLC



ZTS


































NORI 320 ZXLF/ZXSf



NORI 500 ZXLR/ZXSr



SICCA 800-2500 GLF

| | Shut-off valves | | Non-return valves | |
|--|---|---|---|--|
| | Diaphragm valves | Butterfly valves | | |
| ANSI | DIN | DIN/ANSI | DIN | ANSI |
|  <p>SICCA 150-300 GTC</p>  <p>SICCA 800 GTF</p> |  <p>SISTO-10</p>  <p>SISTO-16</p>  <p>SISTO-KB</p>  <p>SISTO-20</p> |  <p>DANAIS</p>  <p>ISORIA</p>  <p>MAMMOUTH</p> |  <p>NORI 40 RXL/RXS</p>  <p>STAAL 40 AKK/AKKS</p>  <p>SERIE 2000</p> |  <p>SERIE 2000</p>  <p>SICCA 150-300 SCC</p> |
|  <p>SICCA 600 GTC</p>  <p>SICCA 900 GTC</p>  <p>SICCA 800 GTF</p> | | |  <p>NORI 160 RXL/RXS</p>  <p>STAAL 100 AKK/AKKS</p>  <p>AKR/AKRS</p> |  <p>SICCA 600 SCC</p>  <p>SICCA 900 SCC</p>  <p>SICCA 800 PCF</p> |
|  <p>SICCA 1500-2500 GTC</p>  <p>SICCA 1500 GTF</p> | | |  <p>NORI 320 RXL/RXS</p>  <p>NORI 500 RXLR/RXSR</p>  <p>RGS</p>  <p>ZRS</p> |  <p>SICCA 1500-2500 SCC</p>  <p>SICCA 1500-2500 PCF</p> |

Special valves

| | | |
|--------------------------|-------------------------------|-------------------|
| Feed water bypass valves | Start and stop control valves | Line blind valves |
|--------------------------|-------------------------------|-------------------|

| | | |
|--------------------------|-------------------------------|-------------------|
| Feed water bypass valves | Start and stop control valves | Line blind valves |
|--------------------------|-------------------------------|-------------------|

| | | |
|--------------------------|-------------------------------|-------------------|
| Feed water bypass valves | Start and stop control valves | Line blind valves |
|--------------------------|-------------------------------|-------------------|

DIN

| |
|-----|
| DIN |
|-----|

| |
|-----|
| DIN |
|-----|

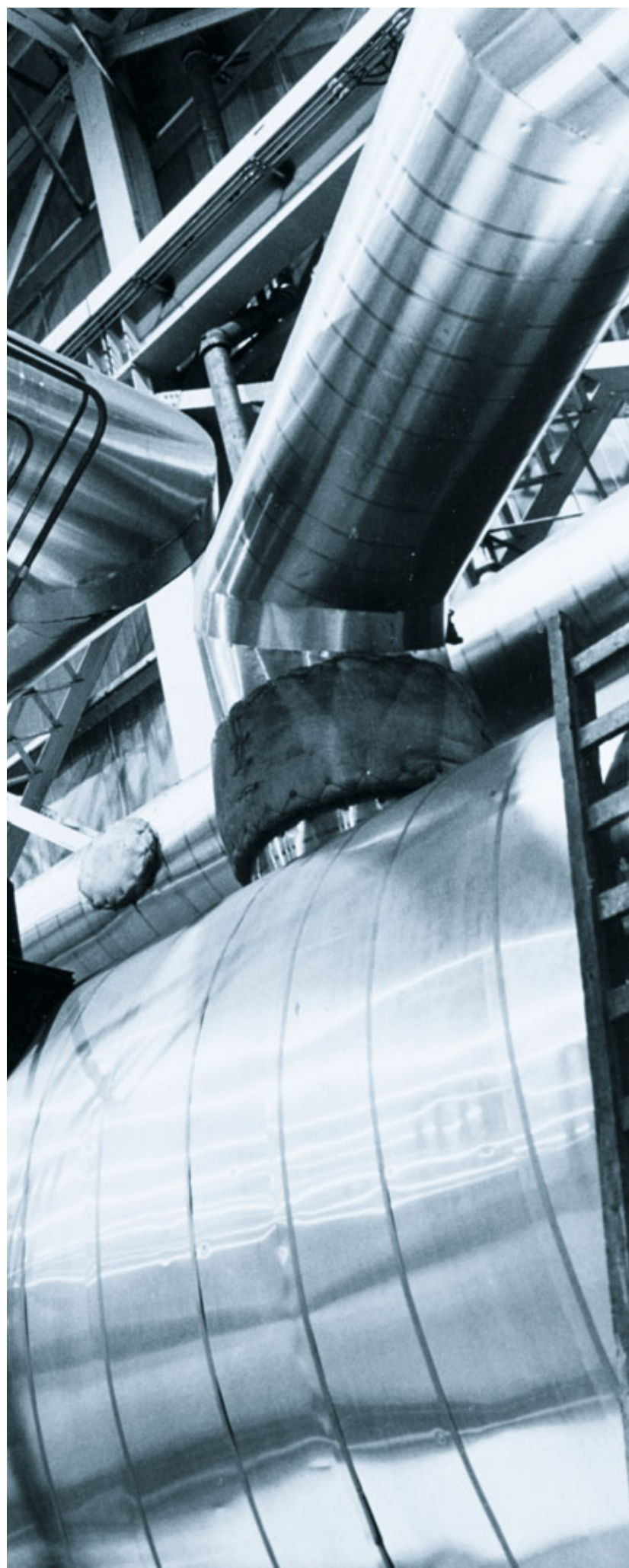


ZJSVM/ RJSVM



**ZJSVA/
ZXSVA**





Getting the most out of energy.

Measure us by the performance of your pump or valve – after we have brought it technologically up to date with the latest components and spare parts. Regardless of who made it in the first place. The result will be longer service life, lower operating costs, extended maintenance intervals and reduced downtimes.

KSB provides all-in solutions. So we can help you plan every stage of modernisation and recommissioning of your plant. From inspection to production of the necessary new components, via fitting, test runs or the installation of new pumps or valves. Even minor retrofitting can make a major difference:

- Energy savings, efficiency improvements and emission reductions
- Monitoring, automatic early warning of faults
- Availability, extension of service lives
- Greater ease of servicing, no maintenance, reduction in auxiliary systems

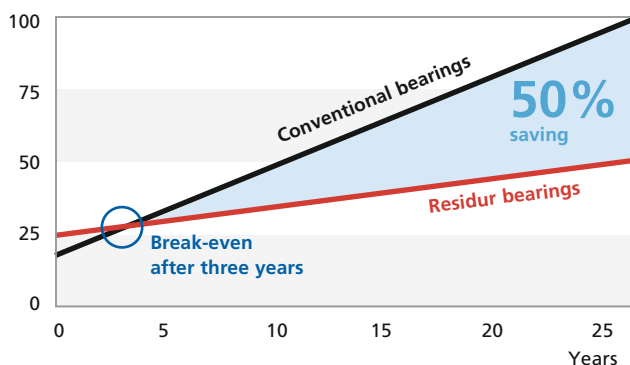


Residur® reduces life cycle costs

Tubular casing pumps in power station cooling circuits operate round the clock under the toughest conditions. Radial bearings made of conventional materials need constant lubrication with fresh water or filtered media handled. That costs time and money. Our specially developed Residur ceramic bearings are lubricated directly by the medium handled. You can retrofit them to any tubular casing pump. Residur has been in use since the early 1980's. Over 25 years, these ceramic bearings save about 50 % of the costs associated with conventional models. Investment costs are recouped in three years.



Life cycle costs in %

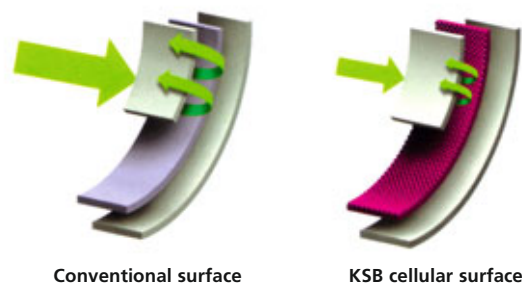


Cells turn a problem into an advantage

In centrifugal pumps, all cylindrical annular clearances are medium-swept. Conventional casing wear rings induce considerable efficiency losses caused by circumferential flow in the annular clearances. However, the clearances act as supplementary bearings and can, depending on their shape, significantly improve the dynamic behaviour of the rotor. KSB has developed cellular surface wear rings to benefit from this



effect. Thanks to their regular pattern of exactly calculated and spark-eroded recesses (cells) with an axis perpendicular to the direction of flow, axial and circumferential flows are extensively decelerated by swirling. This, in turn, leads to optimum stabilisation of the rotor and to much more extensive reduction of leakage losses – as compared to conventional surfaces. Efficiency increases considerably, energy costs fall noticeably, and operating reliability improves.



| Standard solution | Alternative solution | KSB solution |
|-------------------|----------------------|------------------|
| | | |
| Smooth surface | Grooved surface | Cellular surface |

Making it work best for you.

You want optimum performance from your power station 24 hours a day. Which is why we are on call right around the clock. From the project phase through order processing, and on to continuous after-sales service. More than 1,500 KSB specialists form a service network that spans the world. One of our 100-plus service centres is sure to be near you. For us, rapid, comprehensive service is an integral part of product quality. Frequent staff training keeps our standards high. And in parallel we offer detailed, directly relevant courses for our power sta-

tion customers. At KSB, there are many sides to quality. But the goal is always the same: to meet our own particularly strict demands. We take legal regulations as a starting-point, and usually go much further. Our business processes are founded on recognised global quality guidelines, a modern integrated management system (quality management, environmental management, and occupational health and safety), and a quality policy based on the European Foundation for Quality Management (EFQM) business excellence model.





Our products and management systems
are certified to:

- DGR, AD 2000, GOST
- DIN EN ISO 9001:2000
- ISO 14001:2004
- OHSAS 18001:1999

Competence Center Energy

Michael Schneider (Pumps)

Tel.: +49 6233 86-2625

Fax: +49 6233 86-3462

Rainer Dezelski (Valves)

Tel.: +49 9241 71-1656

Fax: +49 9241 71-1795

More space for solutions.



KSB Aktiengesellschaft

Johann-Klein-Straße 9

67227 Frankenthal (Germany)

www.ksb.com